Trophic Ecology of the Gopher Rockfish (*Sebastes carnatus*) Inside and Outside of Marine Protected Areas in Central California

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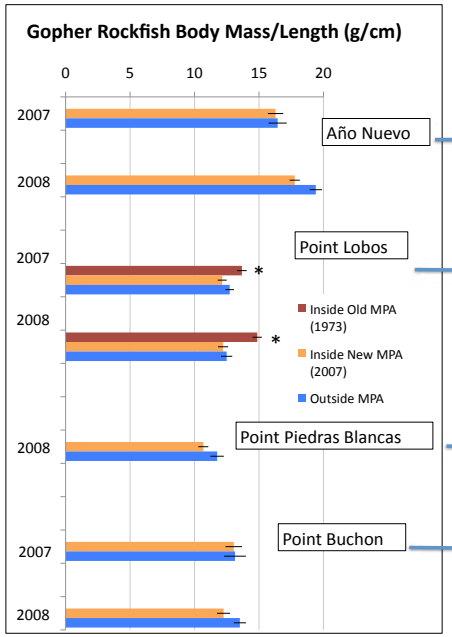
Project Background

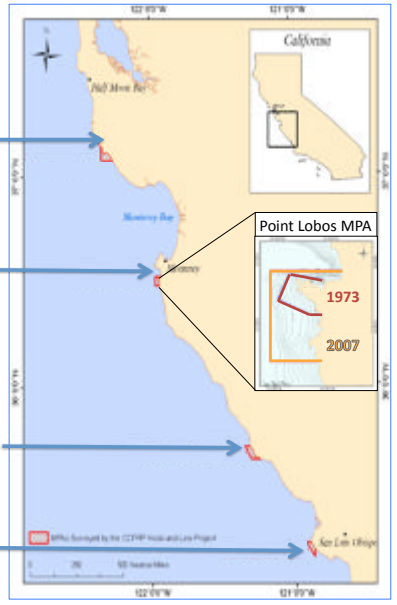
A network of marine protected areas (MPAs) was established on the central California coast in September 2007, with the expectation to evaluate MPA effects. One potential MPA effect is a change in the structure of food webs caused by trophic cascades. The California Collaborative Fisheries Research Program (CCFRP) collected gopher rockfish *(Sebastes carnatus)* from four new MPAs, one old MPA (Point Lobos est. 1973), and nearby unprotected reference sites during baseline surveys in 2007-2009. We chose to examine the diet of the gopher rockfish to establish a baseline of trophic interactions in these areas because it is an abundant, territorial predator, and eats a variety of benthic organisms.

Methods

1. Collected fish with hook & line and fish traps, stored fish frozen.
2. Sampled 4 MPAs est. 2007, 1 est. 1973, and reference sites of similar depth and habitat.
3. Thawed, weighed and measured fish to nearest 0.1 g and 0.1 cm.
4. (a) Dissected stomachs, (b) Counted, weighed and identified prey to lowest taxon.

Are gopher rockfish "bulkier" inside marine protected areas?

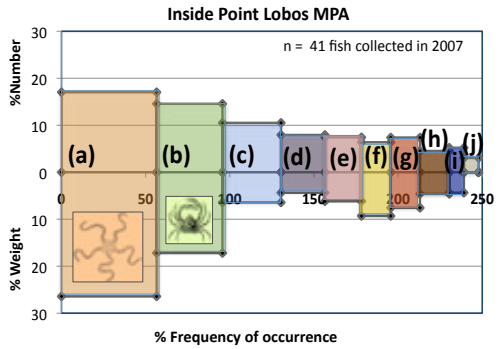


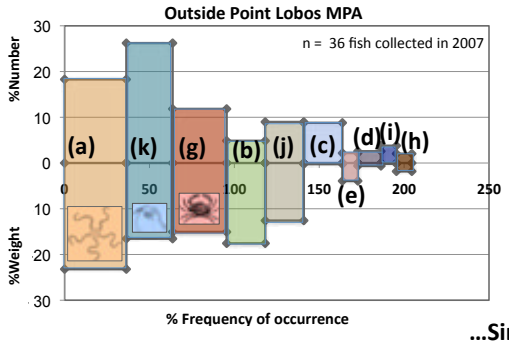


Maps courtesy of Noëlle Yochum

...Yes, no, and maybe later.

What are gopher rockfish eating inside and outside of the Point Lobos MPA?





Major Prey Types:

(a) Spiny brittle stars (*O. spiculata*)
(b) Spider crabs
(c) Shrimp-like crustaceans
(d) Unidentified prey
(e) Cancer crabs
(f) Unidentified brittle stars
(g) Unidentified crabs
(h) Hippolytid shrimp
(i) Crangon shrimp
(j) Polychaetes
(k) Mysid shrimp

Diet Indices for Point Lobos MPA:

	Inside	Outside
Prey Diversity (H')	2.02	1.71
Evenness (J)	0.699	0.617
Index of Specialization (R = 1 - J)	0.301	0.383
Prey Dominance (D)	0.068	0.116
Percent Similarity (Bray- Curtis)		**0.648**

...Similar prey types, different proportions.

Preliminary Results and Discussion

Fish from the original (1973) Point Lobos MPA had significantly greater mass per length than fish from the new Point Lobos MPA or reference site (randomized block ANOVA, *p = 0.007), but this difference from the reference was not apparent when fish from the old and new MPA were pooled (p = 0.437). Randomized block ANOVAs also indicated that there were no significant differences between MPAs and reference sites (p = 0.161), or among geographic areas (p = 0.114) for all MPAs established in 2007, thereby creating a baseline to evaluate future MPA effects. Future analysis will investigate whether differences in diet underlie observed patterns in gopher rockfish mass/length ratios.

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